EASTERN REGION TRAINING AND EVALUATION MODULE NO. 2
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Changing Precipitation Processing Adaptable Parameters for Tropical Situations

Gregory Hanson
Operations Training Branch
Operational Support Facility
Norman, OK

Laurie G. Hermes
Systems Operations Division
Eastern Region Headquarters
NOAA/National Weather Service
Bohemia, NY

This module addresses changing the radar reflectivity/rainfall rate relationship (referred to hereafter as Z/R) and Maximum Precipitation Rate (MXPRA) threshold adaptable parameters in the Precipitation Processing Subsystem (PPS) of the WSR-88D Radar. The reader should have access to the UCP (or UCP simulator) and the PUP Applications Terminal to complete this module.

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1. Objectives

Upon successful completion of this module, the reader[1] will meet the following objectives:

> **a. Without reference to this TEM, state the reason why the Z/R relationship varies from convective to tropical rain events.**
>
> **b. Without reference to this TEM, state the purpose of the MXPRA adaptable parameter.**
>
> **c. Using a UCP terminal or UCP simulator, display and edit the Z/R and MXPRA parameters.**

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[1]It is assumed that the reader has previously completed the Operational Support Facility's (OSF) WSR-88D Operations course (or its equivalent) and Unit Control Position (UCP) training.

d. Without reference to this TEM, state the effects of changing the Z/R parameters and not adjusting the MXPRA parameter.

e. Without reference to this TEM, state the OSF's and Eastern Region Headquarters' (ERH) policies on changing the thresholds for the WSR-88D Z/R relationship and the MXPRA adaptable parameters.

This TEM does not cover methods used to evaluate the meteorological conditions which constitute tropical or convective regimes.

2. Introduction

The PPS of the WSR-88D provides radar-derived precipitation accumulation estimates. One of the steps of the PPS is to convert radar reflectivity (Z) estimates to rainfall rate (R) by using empirically-derived Z/R relationships. Empirical Z/R relationships are based on drop size distributions measured for various atmospheric conditions, obtaining a mathematical "best fit" of observed reflectivity values and observed rainfall rates. Battan (1973) presents more than 50 Z/R relationships.

The default Z/R equation employed by the WSR-88D is $Z=300R^{1.4}$. This relationship has been found to be representative of many types of rainfall regimes, and especially for convective rain.

However, this default Z/R equation is not representative for tropical rain events, as they have a significantly different drop size distribution when compared to convective events. Thus, the radar operator needs the ability to know when (not covered here) and how to make the changes to the proper PPS adaptable parameters. These parameter changes will lead to better precipitation accumulation estimates by the WSR-88D, and in turn, help improve flood and flash flood warning and forecast operations at the Weather Forecast Offices (WFOs) and River Forecast Centers (RFCs).

This module includes a brief overview of Z/R relationships and the effect of drop size distribution on those relationships, and it compares the default Z/R equation to the tropical Z/R relationship. The adaptable parameters at the UCP will be identified and instructions for how to change them will be presented. The OSF and Eastern Region policies and guidelines for changing the PPS adaptable parameters are included as well.

3. Z/R - Deriving a rainfall rate from reflectivity

Radar reflectivity (Z) is proportional to the number of drops in a given sample volume and is proportional to the sixth power of drop diameter[2], where $\sum$ represents the number of drops and D is the drop diameter:

$$Z \propto \sum D^6 \qquad (1)$$

Fig. 1 provides a graphical and mathematical demonstration that Z is more dependent on the size of the drops than on the number of drops. In other words, for a given radar sample volume, a few large drops of rain can yield the same reflectivity value as many small drops.

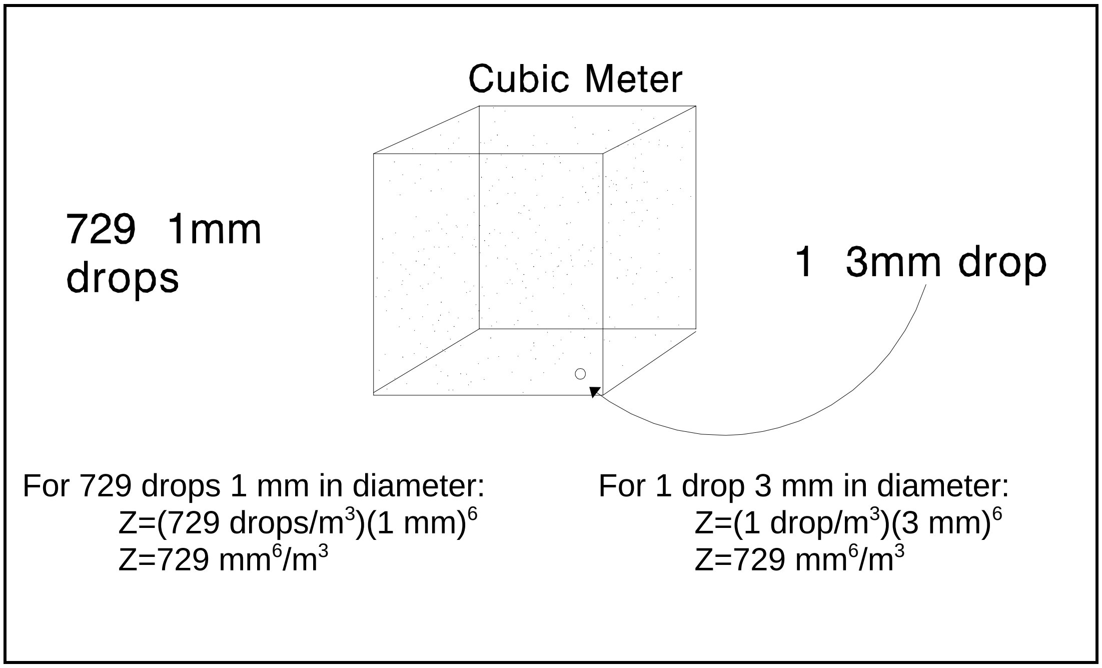

Fig. 1. 729 raindrops 1 mm in diameter will return the same reflectivity (Z) as one raindrop that is 3 mm in diameter (from OSF 1997a).

Rainfall rate (R) is also dependent on the number of drops and their size[3]. However, R is only proportional to the third power of drop diameter:

$$R \propto \sum D^3 \qquad (2)$$

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[2] See Doviak and Zrnić (1984) for the full equation.

[3] See Doviak and Zrnić (1984) for the full equation.

Because of the lower exponent on D in Eq. (2) versus Eq. (1), the number of drops ($\sum$) in a sample volume becomes more significant than D in the estimation of R versus Z. Based on the example in Fig. 1, many small drops yield a higher calculated rainfall rate than just a few large drops (729 vs. 27, respectively), even though their reflectivity values are the same.

Convective rainfall will typically have drop size distributions made up of small concentrations of large drops, while tropical rainfall will have large concentrations of smaller raindrops. From the review above, we know that convective rain (few large drops) and tropical rain (many small drops) may give us the same reflectivity (Z), but by Eq. (2) tropical rain will have a higher rainfall rate (R).

In 1995, the OSF authorized the Unit Radar Committees (URCs) of Eastern Region WSR-88Ds to use $Z=250R^{1.2}$ for tropical rainfall regimes (OSF 1995). This authorization was based on studies that $Z=250R^{1.2}$ produces more representative precipitation accumulation estimates for tropical events than the default WSR-88D Z/R equation ($Z=300R^{1.4}$). For tropical rain events, this default Z/R relationship will cause significant underestimation of precipitation estimates.

Fig. 2 graphically depicts both the standard and tropical Z/R equations. Note the significant differences in the two relationships for reflectivities greater than 40 dBZ. The graph helps demonstrate the differences in rainfall rates using the two Z/R relationships for the same reflectivity value. Using the standard ($Z=300R^{1.4}$) relationship, a return of 50 dBZ yields a rainfall rate of 2.5 inches per hour. Using the tropical relationship ($Z=250R^{1.2}$), the same 50 dBZ return produces a rainfall rate of 5.8 inches per hour. Also note that the tropical relationship can give very unrepresentative rainfall rates at the higher end of the dBZ range.

+++ *PRACTICE*

1. State the tropical Z/R relationship which the OSF has authorized for use at Eastern Region WSR-88D sites.

2. Explain how Z/R relationships are obtained.

4. MXPRA - Maximum Precipitation Rate

An important adaptable parameter that needs consideration when changing the Z/R relationship is the Maximum Precipitation Rate (MXPRA) threshold. This parameter is used to cap the computed precipitation rate to prevent excessive, unrealistic rainfall accumulations. Unrealistic accumulations could result from hail contamination, wet ice, ground returns from

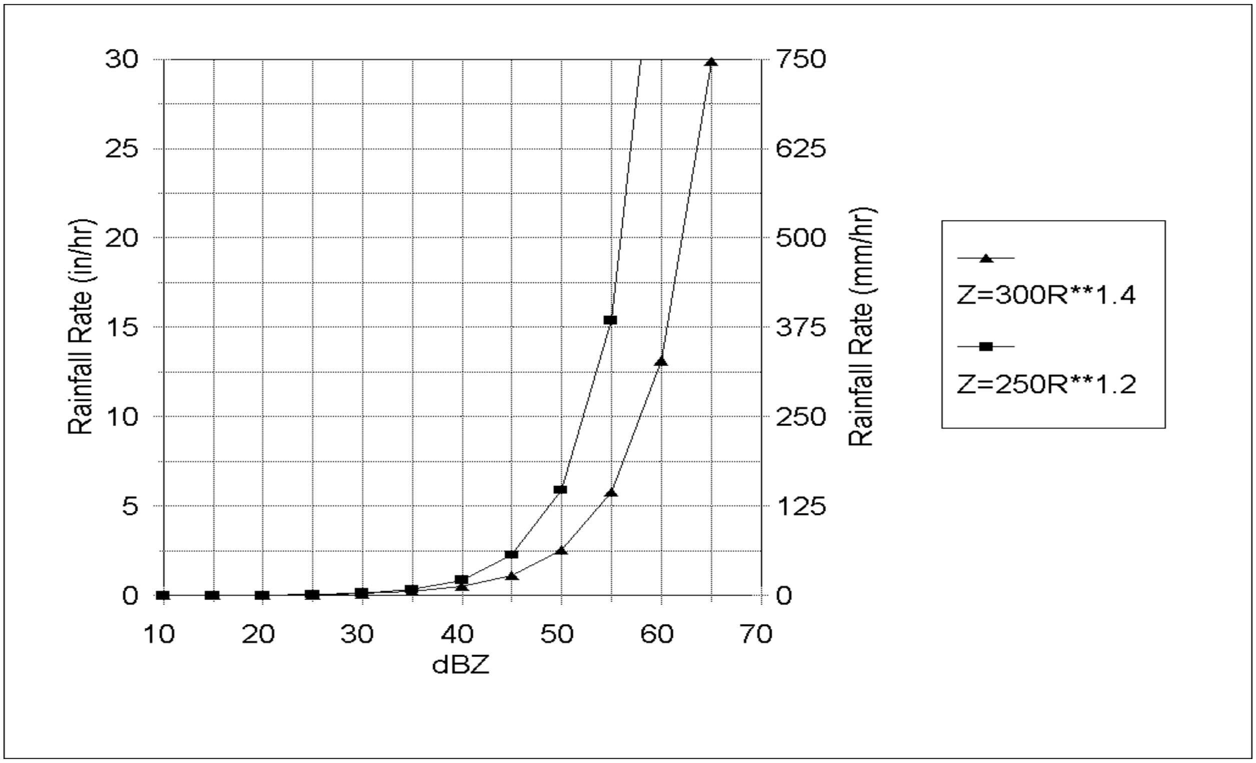

Fig. 2. A Z/R relationship graph for $Z=300R^{1.4}$ (default) and $Z=250R^{1.2}$ (tropical). Note the difference in rainfall rates, especially for reflectivities higher than 40 dBZ. Note units of in/hr (mm/hr) on left (right) hand side of the figure.

anomalous propagation, etc. The default setting for MXPRA is 4.09 in/h (103.8 mm/h).

On occasion, rainfall rates of greater than 4.09 in/h (103.8 mm/h) are observed. Extreme rainfall rates have been observed to occur when a deep warm cloud layer exists and warm rain processes prevail (Maddox et al. 1978). These conditions may exist in the tropical rainfall regimes.

Thus, when the Z/R relationship is changed to $Z=250R^{1.2}$, the UCP operator may also need to change MXPRA so that a higher rainfall rate will be used in the generation of PPS accumulation products. The OSF has authorized the URCs of Eastern Region WSR-88Ds to change MXPRA to 6.00 in/h (152.4 mm/h) when higher rainfall rates are expected by operational forecasters and hydrologists (OSF 1997b).

+++ ***PRACTICE***

1. State the allowable range for the MXPRA theshold that the OSF has authorized for use at Eastern Region WSR-88D sites.

5. Changing parameters back to default settings

When the meteorological conditions that constitute a tropical regime are no longer present in the WSR-88D's coverage area, it is important to change the Z/R and MXPRA parameters back to the default settings. Generally speaking, reflectivity values above 51 dBZ can be attributed more to convective rain rather than tropical rain. Thus, at 51 dBZ and above, it is recommend that the default Z/R be reinstated at the UCP. A lower MXPRA value may also be appropriate, especially if hail is expected.

However, a mix of both tropical and convective types of precipitation can exist within a single radar's coverage area at the same time. Convective cells can be embedded in areas of tropical rain. In this case, leaving the Z/R parameters at the tropical setting will grossly overestimate the precipitation within the convective cells. **This is one of the limitations of applying a single Z/R relationship to the entire radar coverage, and one that the radar operator will have to learn to identify and correctly interpret.**

+++ PRACTICE

1. State two reasons why the Z/R parameters may need to be change from the tropical relationship back to the default relationship.

6. Parameter changes at the UCP

Note: Actual editing of these PPS parameters is not possible using the November 1996 version of the UCP simulator. If using the UCP, be absolutely certain that parameters are set at the appropriate operational settings once the training effort is completed.

To change the Z/R coefficients at the UCP, go to the Z R COEFFICIENTS edit screen by typing at the command line: **AD,(password1),M,(password2),Z**. The screen shown in Fig. 3 will be displayed.

CZM is the multiplicative Z/R coefficient, and CZP is the power Z/R coefficient. To change the parameters, type M on the command line to modify. Set CZM to 300 and CZP to 1.4 for the default. For the tropical Z/R, set CZM to 250 and CZP to 1.2. Press <RETURN> after editing to return the cursor to the command line, then type E to end the edits and save the changes.

MXPRA is changed by typing **AD,(password1),M,(password2),HY,R** at the command line to enter the RATE PRECIPITATION ALGORITHM edit screen. Using the keyboard function keys, page forward to page 2 of the screen and type M on the command line to modify.

```
                    Z R COEFFICIENTS                           PAGE  1 OF  1
COMMAND: AD,*****,M,*****,Z,
FEEDBACK:                                                       OPER A/

     (M)odify  (E)nd  (C)ancel


ITEM           CZM    CZP

---------------------------
CURRENT        300    1.4
---------------------------
MIN             30    1.0
MAX           3000    2.5


Definition                          Units
CZM - Multiplicative Z-R  Coefficient  NA
CZP - Power Z-R Coefficient            NA
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Fig. 3. Z/R Coefficients edit screen.

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                  RATE PRECIPITATION ALGORITHM              PAGE  2 OF  2
COMMAND: AD,*****,M,*****,HY,R,
FEEDBACK:                                                       OPER A/

         (M)odify   (E)nd   (C)ancel

ITEM        RNCUT    COER1    COER2    COER3    MNPRA    MXPRA

----------------------------------------------------------------
CURRENT     230      0.0       1.0      0.0       0.0      103.8
----------------------------------------------------------------
MIN           0      0.0       1.0      0.0       0.0       50.0
MAX         230      3.0      10.0      1.0      10.0     1600.0

Abbr    Description                  Units
RNCUT - Range (Cut-off)              KM
COER1 - Coef. (Range Effect #1)      dBR
COER2 - Coef. (Range Effect #2)
COER3 - Coef. (Range Effect #3)      dBR
MNPRA - Min Precip Rate Processed    MM/HR
MXPRA - Max Precip Rate Allowed      MM/HR
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Fig. 4. Rate Precipitation Algorithm edit screen, page 2 of 2.

Page 2 of 2 of the RATE PRECIPITATION ALGORITHM edit screen is shown in Fig. 4.

MXPRA is the only parameter that you are allowed to change on this screen. Change MXPRA from 103.8 mm/h (4.09 in/h) to 152.4 mm/h (6.00 in/h). Your office's default setting may be slightly higher than 103.8 mm/h, but 152.4 mm/h should be used during tropical events. Press <RETURN> after editing to return the cursor to the command line, then type E to end the edits and save the changes.

Note: Guidance on other RPG adaptable parameter changes are available in "*Guidance on Adaptable Parameters, Operator Handbook, Volume 1, RPG*" (OSF 1996).

+++ PRACTICE

1. Locate and review the screens to modify the PPS adaptable parameters on the UCP Simulator or UCP. Do not make any modifications to adaptable parameters.

7. Policies

Policy on Changing Z/R Adaptable Parameters

All Eastern Region field offices that operate UCPs are authorized to change the Z/R adaptable parameters from the default value ($Z=300R^{1.4}$) to the tropical value ($Z=250R^{1.2}$) at any time the UCP operator thinks this would be beneficial to the NWS operational mission (OSF 1995). This parameter change should be pre-coordinated with other URC members.

Policy on Changing MXPRA Thresholds

All Eastern Region field offices that operate UCPs are authorized to change the MXPRA threshold from the default value of 103.8 mm/h (4.09 in/h) to any value up to and including 152.4 mm/h (6.00 in/h) at any time the UCP operator thinks this would be beneficial to the NWS operational mission (OSF 1997b). This parameter change should also be pre-coordinated with other URC members.

Notification Policy

AFOS Change notices 1035 and 1074 authorize the use of the AFOS Free Text Message (FTM) for all WSR-88D sites. Eastern Region Headquarters has issued a memorandum (NWS 1997) that recommends FTM use for "notification of a meteorological algorithm parameter change, such as use of the tropical or nominal Z/R relationship."

This FTM notification is especially important for the proper interpretation of precipitation accumulation products (OHP, THP, STP, and USP) by users at RFCs and nearby offices.

NWSFOs, NWSOs, and RFCs shall have the FTM keys for nearby radars alarmed or alerted in their AFOS system. During major precipitation events, RFCs may summarize the Z/R status for radars in their area of responsibility. The RFC HAS forecasters may also recommend when the tropical Z/R relationships should be used. The NWS disseminates the FTM products via Family of Services (FOS).

For on-site informational purposes, the UCP operator should record changes of these adaptable parameters on the UCP shift checklist, operations log book, or other appropriate methods established at the NWSFO and NWSO offices.

Current settings of all the PPS parameters, and the Z/R coefficients and MXPRA parameters in particular, can be viewed on the alphanumeric OHP or STP at the PUP applications terminal. At the PUP applications terminal command line, type **D,A,OHP** or **THP** to display the products. The Z/R coefficients can be found on page 2 of the alphanumeric product, and the MXPRA parameter is listed on page 3. See examples of the PUP screens in Figs. 5 and 6.

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               ALPHA PRODUCT 78 (OHP  KICT 19:13  07/10/97)     Page 2 of 5

COMMAND:  D,A,OHP
FEEDBACK:

MIN THRESHOLD DBZ FOR ISOLATED BIN TEST.....................     18.00 DBZ
MAX DBZ ALLOWED BEFORE BEING LABELED AS OUTLIER.............     65.00 DBZ
TILT-TEST LOW REFLECTIVITY (DBZ) VALUE......................      1.00 DBZ
INNER RANGE LIMIT FOR TILT TEST.............................     40.00 KM
OUTER RANGE LIMIT FOR TILT TEST.............................    150.00 KM
MAX RANGE OF BI-SCAN MAXIMIZATION...........................    230.00 KM
MIN PRECIP ECHO AREA NEEDED FOR TILT TEST IN LOW ELEV.......    600.0 KM**2
MIN AREA-WGTD-REFLECT. NEEDED FOR TILT TEST IN LOW ELEV.....     10.00 DBZ
MAX % AREA REDUCTION BETWEEN 2 LOWEST ELEVATIONS............     75.00  %
REFLECT-TO-PRECIP RATE CONVERSION MULTIPLICATIVE COEFFICIENT    300.00
REFLECT-TO-PRECIP RATE CONVERSION POWER COEFFICIENT.........      1.40
MIN DBZ FOR CONVERTING TO PRECIP RATE (VIA TABLE LOOKUP)....      0.00 DBZ
MAX DBZ FOR CONVERTING TO PRECIP RATE (VIA TABLE LOOKUP)....     65.00 DBZ
MIN RANGE OF BI-SCAN MAXIMIZATION...........................    180.00 KM
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Fig. 5. One Hour Precipitation screen at PUP Applications Terminal, page 2 of 5. The Z/R adaptable parameters are the fourth and fifth items from the bottom of the page.

+++ *PRACTICE*

1. Locate and review the OSF authorization memoranda, ERH FTM memorandum, or Station Duty Manual references to these policies on station.

2. Locate the PUP screens where the current settings of PPS adaptable parameters are visible.

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               ALPHA PRODUCT 78 (OHP  KICT 19:13  07/10/97)     Page 3 of 5

COMMAND:  D,A,OHP
FEEDBACK:

MAX STORM SPEED (M/SEC).....................................     25.0 M/Sec
MAX SCAN-TO-SCAN TIME DIFFERENCE FOR TIME CONTINUITY TESTS..     15.00 MIN
MIN PRECIP-AREA FOR PERFORMING TIME CONTINUITY TESTS........    200.0 KM**2
RATE OF CHANGE: VOLUMETRIC PRECIP RATE, MIN ECHO AREA.......     24.00 1/Hr
RATE OF CHANGE: VOLUMETRIC PRECIP RATE, FULL ECHO UMBRELLA..     13.20 1/Hr
MAX ECHO-AREA RATE OF CHANGE ............................... 200.0 KM**2/Hr
RANGE BEYOND WHICH TO APPLY RANGE-EFFECT CORRECTION.........    230.00 KM
1ST COEFFICIENT OF RANGE-EFFECT FUNCTION....................      0.00 DBR
2ND COEFFICIENT OF RANGE-EFFECT FUNCTION....................      1.00
3RD COEFFICIENT OF RANGE-EFFECT FUNCTION....................      0.00
MIN RATE SIGNIFYING PRECIPITATION...........................      0.0 MM/Hr
MAX PRECIPITATION RATE......................................    103.8 MM/Hr
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Fig. 6. One Hour Precipitation screen at PUP Applications Terminal, page 3 of 5. The MXPRA threshold is the last item on the page.

8. Conclusion

Drop size distribution plays an important role in reflectivity and rainfall rate estimates. For a given sample volume, many small raindrops will yield a higher calculated rainfall rate than just a few large drops, even though their calculated reflectivities will be the same. Tropical rain is characterized by many small drops, and convection will have fewer but larger rain drops. Thus both convective and tropical rainfall events can yield the same reflectivities, while the latter will produce higher rainfall rates and precipitation accumulations at the ground.

Empirically derived Z/R relationships are used to calculate rainfall rates from reflectivity. For reasons stated above, these relationships differ in tropical regimes from those of nontropical regimes. Because of this, the Z/R equation must be adjusted during tropical rain events so that precipitation underestimation does not occur. The tropical Z/R is $Z=250R^{1.2}$. The standard (default) Z/R equation is $Z=300R^{1.4.}$

MXPRA is a parameter in the PPS that caps precipitation rates so that unrealistic accumulations are not calculated. For tropical rain events, rainfall rates actually exceed the default setting. In those cases, MXPRA should be adjusted from the default setting of
103.8 mm/h, to 152.4 mm/h.

References

Battan, L. J. 1973: *Radar Observations of the Atmosphere*. Univ. Of Chicago Press, 324 pp.

Doviak, R. J. and D.S. Zrnić 1984: *Doppler Radar and Weather Observations*. Academic Press, 458 pp.

Maddox, R. A., L. R. Hoxit, C. H. Chappell, and F. Caracena, 1978: Comparison of the meteorological aspects of the Big Thompson and Rapid City flash floods. *Mon. Wea. Rev.*, **106**, 375-389.

National Weather Service, 1997: Memorandum entitled *"AFOS Free Text Message for WSR-88D System Status Changes,"* NOAA, U. S. Department of Commerce, 4 pp [Available from the Eastern Region Headquarters, 630 Johnson Avenue, Bohemia, NY 11716].

Operational Support Facility, 1995: Memorandum entitled *"Adaptable Parameter Changes to Improve WSR-88D Tropical Rainfall Estimates,"* NOAA, U. S. Department of Commerce, 4 pp [Available from the Operational Support Facility, 1200 Westheimer Dr., Norman, Oklahoma 73069].

________________________, 1996: Guidance on Adaptable Parameters. *Operator Handbook, Volume 1, RPG*, NOAA, U. S. Department of Commerce [Available from the Operational Support Facility, 3200 Marshall Ave., Norman, Oklahoma 73032], 3-41.

______________________, 1997a: Principles of Meteorological Doppler Radars. *WSR-88D Operations Course Student Guide*, NOAA, U. S. Department of Commerce [Available from the Operational Support Facility,3200 Marshall Ave., Norman, Oklahoma 73032], 3-41.

________________________, 1997b: Memorandum entitled *"Response to Request for Regional Authority to Change the Value of the Maximum Precipitation Rate,"* NOAA, U. S. Department of Commerce, 2 pp, one attachment [Available from the Operational Support Facility, 1200 Westheimer Dr., Norman, Oklahoma 73069].

ANSWERS TO PRACTICE EXERCISES

Section 3

1. The OSF has authorized use of the tropical Z/R relationship, $Z=250R^{1.2}$.

2. Empirical Z/R relationships are based on drop size distributions measured for various atmospheric conditions, obtaining a mathematical "best fit" of observed reflectivity values and observed rainfall rates.

Section 4

1. The allowable range for MXPRA is 103.8 mm/h (4.09 in/h) up to and including 152.4 mm/h (6.0 in/h).

Section 5

1. The answers could include the following reasons:
    a. Reflectivities have exceeded values of 51-53 dBZ; i.e., the regime has become more convective in nature. Rain estimates could become contaminated from high reflectivity returns from hail aloft.

    b. A significant air mass change has occurred such that a tropical Z/R relationship is not representative.

    c. The tropical Z/R relationship is unrepresentative (likely overestimating rain amounts) as compared to reliable gage and/or observer estimates.

    d. A nearby radar site has tried the tropical Z/R relationship and has found it unrepresentative for the air mass moving into the area.

Section 6

1. The reader should find the UCP or UCP simulator and type at the command line: **AD,(password1),M,(password2),Z**. Fig. 3 from Section 6 of the TEM will be displayed.

    The reader should next type: **AD,(password1),M,(password2),HY,R** at the UCP command line. Fig. 4 from Section 6 of the TEM will be displayed.

Section 7

1. The reader should be able to locate, in an on-station reference, the policy documents discussed in Section 7. If these are unavailable in the operations area, either your local WSR-88D focal point, SOO, or MIC should have copies of these documents.

2. The reader should find PUP screens by typing, **D,A,OHP** or **D,A,THP** on the APUP Applications Terminal**.** Figs. 5 and 6 from Section 7 of the TEM will be displayed.

EVALUATION

Note: Actual editing of the PPS parameters (Z/R and MXPRA) is not possible on the November 1996 version of the UCP simulator. If using the UCP, be absolutely certain that parameters are set at the appropriate operational settings once the training effort is completed.

1. State the main reason for using the tropical Z/R relationship.

2. Explain the importance of also changing MXPRA when the tropical Z/R equation is implemented.

3. List the main operational concern of using a value of MXPRA that is too high.

4. At the UCP or UCP simulator, change the PPS adaptable parameters from the default Z/R equation to the tropical Z/R equation.

5. At the UCP or UCP simulator, change the PPS adaptable parameter MXPRA from the default value to the maximum value authorized by the OSF.

6. State the AFOS product that should be sent when PPS adaptable parameters are changed at your station.

ANSWERS TO EVALUATION EXERCISES

Note: Actually editing of the PPS parameters (Z/R and MXPRA) is not possible on the November 1996 version of the UCP simulator. If using the UCP, be absolutely certain that parameters are set to the appropriate operational settings once the training effort is completed.

1. State the main reason to use the tropical Z/R relationship.

A significant air mass change has occurred over the radar coverage umbrella, so that a tropical Z/R relationship is more representative of the type of drop size distributions expected in the precipitating clouds.

2. Explain the importance of also changing MXPRA when the tropical Z/R equation is implemented.

In tropical rainfall regimes, rainfall rates of greater than the default value for MXPRA, 4.09 in/h (103.8 mm/h) are occasionally observed; hail is rarely observed.

3. List the main operational concern of using a value of MXPRA that is too high.

If MXPRA is too high for the given environment (a relatively shallow moist layer with cold temperatures aloft), precipitation accumulations may be overestimates of what is actually occurring. This overestimation is likely caused by reflectivity returns from hail aloft versus returns from rain drops.

4. At the UCP, change the PPS adaptable parameters from the default Z/R equation to the tropical Z/R equation.

To change the Z/R coefficients at the UCP, the trainee should go to the Z R COEFFICIENTS edit screen by typing at the command line:

AD,(password1),M,(password2),Z.

To change the parameters, type M on the command line to modify. Set CZM to 300 and CZP to 1.4 for the default. For the tropical Z/R, set CZM to 250 and CZP to 1.2. Press <RETURN> after editing to return the cursor to the command line, then type E to end the edits and save the changes.

5. **At the UCP, change the PPS adaptable parameter MXPRA from the default value to the maximum value authorized by the OSF**.

   MXPRA is changed by typing at the UCP command line:

   AD,(password1),M,(password2),HY,R

   Using the keyboard function keys, the trainee should page forward to page 2 of the screen and type M on the command line to modify the MXPRA threshold. The trainee should tab over to the MXPRA threshold and change MXPRA from 103.8 mm/h (4.09 in/h) to 152.4 mm/h (6.00 in/h). Press <RETURN> after editing to return the cursor to the command line, then type E to end the edits and save the changes.

6. **State the AFOS product that should be sent when PPS adaptable parameters are changed at your station.**

   You should transmit a product of CCCFTMXXX; where CCC is your AFOS node and XXX corresponds to the RDA site identifier KXXX (i.e., not your office identifier).

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<u>Reminder to evaluators</u>: If using the UCP for these evaluation exercises, be absolutely certain that parameters are set to the appropriate operational settings once this evaluation is completed.